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MOTOROLA, INC
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SCHAUMBURG, ILLINOIS 60196,
U.S.A.

00615336004

Patents ADP number (if you know it)

08281107001

If the applicant is a corporate body, give the country/state of its incorporation

U.S.A.

DELAWARE

4. Title of the invention

METHOD AND MOBILE STATION FOR AUTOMATIC CREATION OF TALK GROUP

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

DEREK JAMES MCCORMACK
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UK
ADP NO. 00001180006

Patents ADP number (if you know it)

08128241001

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Country

Priority application number
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Date of filing
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Number of earlier application

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Description 14

Claim(s) 5

Abstract 1

Drawing(s) 676

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Signature

Date

Derek James McCormack

18/9/2003

12. Name and daytime telephone number of person to contact in the United Kingdom

DEREK JAMES MCCORMACK

Louise CRISTOFOLI

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Field of the Invention

Field of the Invention

Background of the Invention

Background of the Invention

Digital addressing used in these systems allows for partitioning of the plurality of MSSs into talk groups. Mobile stations arranged in talk groups usually have a similar function or geographic location however other basis for partitioning is also possible. A mobile station initiating a talk group call to other mobile stations within its talk group such that the other members will receive the communication simultaneously. Selection of talk group programmed into the mobile station allows the user to select and operate on one of many possible talk groups at any instant in time. This functionality of talk groups is important and very useful especially in public safety applications.

Ability of simultaneous communication with plurality of other MSs is particularly important in emergency situations.

One method of controlling operation of mobile stations known in the art is to rely on a dispatcher. Verbal or text messages are broadcasted from the dispatcher to all mobile stations in the talk group. In
5 emergency situations, e.g. in case of an accident it takes time for the dispatcher to create a talk group and to assign as well as communicate the messages to the personnel closest to an incident. Such method causes some delay as usually additional exchange of information
10 is required.

Summary of the Invention

There is a need for a method of automatic creation of a talk group in a digital radio communication system
15 and for a mobile station for use in such communication system, which alleviate or overcome the disadvantages of the prior art.

According to a first aspect of the present
20 invention there is thus provided a method of automatic creation of a talk group in a digital radio communication system as claimed in claim 1.

According to a second aspect of the present
25 invention there is thus provided a mobile station for use in a digital radio communication as claimed in claim 18.

The present invention beneficially allows for
30 short-cutting the manually process of coordinating a dispatch in response to an emergency message, by immediately and automatically creating a talk group which may provide support to the unit sending the emergency message and automatically adding the closest

emergency service unit (or units) to the dynamically created talk group.

5 **Brief description of the drawings**

The present invention will be understood and appreciated more fully from the following detailed description taken in conjunction with the drawings in which:

10

FIG. 1 is a schematic illustration of a communication system operating in accordance with one embodiment of the present invention,

15

FIG. 2 is a flow chart illustrating a method of automatic creation of a talk group in a first embodiment of the present invention,

20

FIG. 3 is a flow chart illustrating a method of automatic creation of a talk group in a second embodiment of the present invention,

25

FIG. 4 is a flow chart illustrating a method of automatic creation of a talk group in a third embodiment of the present invention,

30

FIG. 5 is a flow chart illustrating a method of automatic creation of a talk group in a fourth embodiment of the present invention,

FIG. 6 is a block diagram of a mobile station in one embodiment of the present invention.

Detailed description of an embodiment of the invention

The term a dispatch centre herein below refers to a specialized radio communication unit, preferably equipped with additional computer operated support
5 units, which is adapted to control at least portion of mobile stations of a communication system

The term infrastructure herein below refers to hardware and software elements that forms a
10 communication network and allow for transmitting voice and/or data over the radio channel(s).

Referring to FIG. 1 one embodiment of a wireless communication system 100 according to the present
15 invention is shown. The communication system comprises a plurality of mobile stations (MSs) 102 - 116, a dispatch centre 148 and an infrastructure 120, 136 - 146, which allows for communication in trunking mode as well as in direct mode. Alternatively the communication system 100
20 may comprise only the plurality of MSs 102 - 116 and said dispatch centre.

The invention allows for automatic creation of a talk group in a wireless communication system 100 in a
25 situation when a user of one of said MSs 102 - 116 is in an emergency situation or is a witness of an emergency situation (e.g. a car accident).

With reference to Fig. 2 and Fig. 6 one embodiment
30 of a method of automatic creation of a talk group according to the present invention is shown. When a user of a first mobile station 102 is in an emergency situation and presses a dedicated button on the first MS 102 an emergency message is transmitted over the air 200
35 on a broadcast channel. Said emergency message contains

at least an ID of the mobile station 102, identification that this is an emergency message and current geographical localization of the transmitting MS. Said emergency message may optionally contain a short indication what type of emergency service is required (e.g. police, an ambulance, a fire brigade, etc). Transmitting this additional information could require manual typing by the user or choosing from the list stored in a memory 612 of the MS 600. Other mobile stations 104 - 116, after receiving said message, automatically transmit 202 their IDs and localization data also on said broadcast channel. In a next step 204, 206 those MSs which transmitted their IDs and localization data and are located within a predefined distance D1 from said first mobile station 102 are selected to a talk group.

Alternatively all MSs that replied to said emergency message are selected to said talk group.

If there is no MS within said predefined distance or the number of MSs within said predefined distance is too small 208 said predefined distance D1 is increased 216 to D2 and other MSs located within distance D2 are selected to said talk group.

In one embodiment said selection 204, 206 is performed by said first mobile station, which is equipped with a microprocessor 610 and a memory 612. Said IDs and localization data received in response to said emergency message are stored in said memory 612 and said microprocessor 610 is adapted to calculate the distances between said first mobile station and any one of said other mobile stations which have responded to said emergency message and then create a talk group

comprising other mobile stations based on said calculated distances. This embodiment is applicable to communication systems without an infrastructure or to a situation when infrastructure is not used.

5

Alternatively for a communication system with an infrastructure said step of selecting MSs to said talk group is performed by said infrastructure 120, 136 - 146.

10

When said talk group is created or at the time of selecting said MSs to said talk group an emergency service unit 118 is localized 210 and selected 212 to said talk group. The emergency service unit 118 closest to said first mobile station is selected even if its distance is bigger than the predefined distance D1. If the emergency situation requires it is possible that more than one emergency service unit is selected to said talk group.

20

For communication systems with said infrastructure 120, 136 - 146 a dispatch centre 148 transmits driving directions to said emergency service unit (or units) 118.

25

Referring to Fig. 3 and Fig. 6 a second embodiment of a method of automatic creation of a talk group according to the present invention is shown. When a user of a first mobile station 102 is in an emergency situation and presses a dedicated button on the first MS 102 an emergency message is transmitted over the air 200. Other mobile stations 104 - 116, after receiving said message, automatically transmit 202 their IDs and localization data but only if they are localized within a predefined distance D1 from said first mobile station.

35

If there is response from said other MSs 304 a talk group is being created 206. If there is no other mobile station within said predefined distance D1 from said first mobile station 304 said other mobile stations, which distance from said first mobile station is larger than said predefined distance D1, transmit their ID and localization data 306 in response to said emergency message. As the emergency message and the responses are transmitted on the broadcast channel said other MSs listen to messages transmitted over the air and they know that no response was transmitted to said emergency message. They reply if there was no response from within D1 within a predefined period of time.

15 In alternative embodiments said response messages can be transmitted also over a dedicated channel.

After creation of said talk group or at the time of selecting MSs to said talk group, which can be done in the same way as in case of the first embodiment described above, a closest emergency service unit (or units) 118 is localized 210 and selected 212 to said talk group.

25 For communication systems with an infrastructure 120, 136 - 146 a dispatch centre 148 transmits driving directions to said emergency service unit (or units) 118.

30 For communication systems with infrastructure said selection 304, 206, 210, 212 is being done by said infrastructure or by a dispatch centre 148 and for communication systems without infrastructure or when infrastructure is not used said selection is being done by said first mobile station 102.

With reference to Fig. 4 and Fig. 6 a third embodiment of a method of automatic creation of a talk group according to the present invention is shown. When
5 a user of a first mobile station 102 is in an emergency situation and presses a dedicated button on the first MS 102 an emergency message is transmitted over the air 200 on a broadcast channel. Other mobile stations 104 - 116, after receiving said message, automatically transmit 202
10 their IDs and localization data but only if they are localized within a predefined distance D1 from said first mobile station. If there is no response 304 to said emergency message said predefined distance is increased 402 and said emergency message is transmitted
15 again 404. (The other mobile stations 106, 108, 114, 116 located beyond said predefined distance transmit their IDs and localization data if they receive the same emergency message transmitted again.) If there is a response from at least portion of said other mobile
20 stations 106, 108, 114, 116, the talk group is being created which consist of the first mobile station 102 and other mobile stations that responded to said emergency message.

25 After creation of said talk group or at the time of selecting MSs to said talk group, which can be done in the same way as in case of the first embodiment described above, a closest emergency service unit (or units) 118 is localized 210 and selected 212 to said
30 talk group.

For communication systems with an infrastructure 120; 136 - 146 a dispatch centre 148 transmits driving directions to said emergency service unit (or units)
35 118.

For communication systems with said infrastructure 120, 136 - 146 said selection 304, 206, 210, 212 is being done by said infrastructure 120, 136 - 146 or by said dispatch centre 148 and for communication systems without said infrastructure or when said infrastructure is not used said selection is being done by said first mobile station 102.

10 With reference to Fig. 5 and Fig. 6 a fourth embodiment of a method of automatic creation of a talk group according to the present invention is shown. When a user of a first mobile station 102 is in an emergency situation and presses a dedicated button on the first MS 15 102 an emergency message is transmitted over the air 200 on a broadcast channel. Other mobile stations 104 - 116, after receiving said message, automatically transmit 202 their IDs and localization data. Said other mobile stations 104 - 116 transmit their responses 502, 504, 20 506 with some delay and the value of said delay depends on the distance from said first mobile station to any one of said of the mobile stations 104 - 116. A relation between said delay and said distance is presented in Table 1. It is obvious that the delay may be increased 25 in many different ways and the one presented in Table 1 is an example only.

Table 1

Distance D	Delay
$D \leq D_1$	No delay
$D_1 < D \leq D_2$	T1
$D_2 < D \leq D_3$	2xT1
.

If there is a response from the other mobile stations located within distance D1 said other mobile stations are selected and said talk group is created 206. If there is no other mobile station 508 within distance D1 from said first mobile station 102 other mobile stations located within distance D2 are selected and said talk group is created 206. If there is no other mobile station 510 within distance D2 other mobile stations located within distance D3 are selected and said talk group is created 206. This procedure may be repeated as long as at least one of the other mobile stations will be found within some predefined distance from said first mobile station 102.

15

After creation of said talk group or at the time of selecting MSs to said talk group, which can be done in the same way as in case of the first embodiment described above, a closest emergency service unit (or units) 118 is localized 210 and selected 212 to said talk group.

For communication systems with an infrastructure 120, 136 - 146 a dispatch centre 148 transmits driving directions to said emergency service unit (or units) 118.

For communication systems with said infrastructure 120, 136 - 146 said selection 508, 510, 512, 206, 210, 212 is being done by said infrastructure 120, 136 - 146 or by a dispatch centre 148 and for communication systems without infrastructure or when infrastructure is not used said selection is being done by said first mobile station 102.

Alternatively for communication systems with the infrastructure, when the talk group is created, information on the talk group (including IDs of members of the talk group and their localization data) can be
5 transmitted to a dispatch centre 148. After this transfer the dispatch centre 148 takes over control of the talk group.

Importantly, an advantage of this invention is that
10 by limiting the number of said other mobile stations that respond at the same time (e.g. only those MSs located within predefined distance are allowed to respond or by introducing delay for transmitting response, etc.) allows for limitation of the risk of
15 system congestion.

The localization data transmitted by said first mobile station and said other mobile stations are data obtained via GPS system or calculated based on
20 triangulation data. It is obvious for those skilled in the art that other localization/positioning system's data may be used.

In those embodiments where the communication system
25 operates in trunking mode, said predefined distance can be limited to the borders of a cell 122 or to the borders of a group of cells 124 - 134 within which said first mobile station is located. However actual distance measured in length units may also be applied.

30

It is obvious for those skilled in the art that the mobile unit can be either a portable or mobile radio.

Referring to Fig. 6 one embodiment of a mobile
35 station capable of operating in accordance with the

disclosed method is depicted. The mobile station of Fig. 6 may be either a portable- or a mobile digital or analog radio. The mobile station 600 comprises a microphone 620 which provides a signal for transmission
5 by transmission circuit 602. Transmission circuit 602 transmits via Radio Frequency (RF) switch 604 and antenna 606. The mobile station 600 also has a microprocessor 610 and a memory 612. The mobile station 600 also comprises a display 618 and keypad 616. Voice
10 activation of the radio, or other means of interaction with a user, may also be implemented. Signals received by the radio are routed by the RF switch 604 to a receiving circuit 608. The received signals are routed from the receiving circuit 608 to microprocessor 610 and
15 audio processing circuitry 624 and 626. A localization circuitry 614, which in one embodiment may be a GPS circuitry is connected to said microprocessor 610. A dedicated emergency switch 622 is also connected to said microprocessor 610.

20

In operation said emergency switch 622 when activated initiate the microprocessor to transmit an emergency message which contains at least indication that this is an emergency message, ID of said mobile
25 station and current geographical position of said mobile station. Said geographical position is provided by said localization circuitry 614. When said communication 600 unit receives an emergency message said microprocessor calculates distance between said mobile station and
30 another mobile station, which has sent the emergency message. For these calculations the microprocessor uses localization data received in said emergency message and obtained from said localization circuitry 614. Depending on the result of calculations and on the embodiment of
35 the method according to the present invention used the

microprocessor initiate transmission of the response message (containing ID and its localization data) or not.

5 When said mobile station 600 receives messages with said IDs and localization data in response to said emergency message the microprocessor 610 stores them in a memory 612. The microprocessor 610 uses the data
10 said first mobile station and any one of said other mobile stations which have responded to said emergency message. Next the microprocessor selects to a talk group those of said other mobile stations, which are located within a predefined distance from the mobile station,
15 which transmitted the emergency message. When the selection is completed the talk group is created.

 In any of the embodiments the dispatch centre 148 is preferably added to said talk group.

20

 It is worth to emphasise that all these embodiments of the method according to the present invention may be implemented in a communication system with an infrastructure (for communication in direct mode as well
25 as in trunking mode) or without an infrastructure. In implementation in a communication system with an infrastructure selection of MSs to the talk group is done by said infrastructure (e.g. zone controller). Said calculation of distance can be done by either by
30 the infrastructure or by the MSs. When the method is implemented in a communication system without infrastructure or when the infrastructure is not used then selection of MSs to the talk group and calculation of the distances is done by said the first mobile
35 station (some calculations are also to be done by the

14

other mobile stations). It is also possible that the steps of calculation and selection are performed by said first mobile station and said step of transmitting directions 214 to said emergency service unit (or units) 5 is performed by a dispatch centre 148.

Claims

1. A method of automatic creation of a talk group in a
5 wireless radio communication system (100) comprising a
plurality of mobile stations (102 - 116), said method
comprising the steps of:
- 10 a) transmitting (200) by a first mobile station (102)
an emergency message containing at least its ID and
localization data and indication that this is an
emergency message;
 - b) transmitting (202) by other mobile stations their
IDs and localization data in response to said
emergency message;
 - 15 c) creating (206) said talk group by selecting those
mobile stations which transmitted their IDs and
localization data.
2. A method according to claim 1, wherein only those
20 other mobile stations, which are within a predefined
distance from said first mobile station transmits their
IDs and localization data.
3. A method according to claim 2, wherein for
25 communication system operating in trunking mode said
predefined distance is limited to the borders of a cell
within which said first mobile station is located or to
a group of cells.
- 30 4. The method according to claim 2 or 3, wherein said
other mobile stations, which distance from said first
mobile station is larger than said predefined distance,
transmit their localization data if there is no other
mobile station within said second predefined distance.

5. The method according to claim 4 comprising the step of:

- a) increasing said predefined distance if no one of said other mobile station responded to said emergency message;
- b) re-sending said emergency message.

6. The method according to claim 1 or claim 5, wherein said other mobile stations transmit their IDs and localization data with a predefined delay and said predefined delay increases with increasing distance from said first mobile station.

7. The method according to claim 1 or claim 6, wherein only those of said other mobile stations which are within a predefined distance from said first mobile station are selected to said talk group.

8. The method according to claim 7, wherein some of said other mobile stations, which are located beyond said predefined distance, are selected to said talk group if there is no one of said other mobile stations within said predefined distance or the number of said other mobile stations is below a predefined threshold.

9. The method according to any one of preceding claims, wherein after receiving said IDs and localization data of said other mobile stations, said step of selecting is performed by said first mobile station.

10. The method according to claim 9, wherein after creation of said talk group information on said talk group is transmitted to a dispatch centre, said

information includes IDs of members of said talk group and their localization data.

11. The method according to any one of claims 1 - 8,
5 wherein after receiving said IDs and localization data of said other mobile stations, said step of selecting is performed by an infrastructure.

12. The method according to any one of preceding
10 claims, wherein at least one an emergency service unit, located closest to said first mobile station is added to said talk group.

13. The method according to any one of claims 10 - 12,
15 wherein a dispatch centre transmits driving directions to said emergency service unit.

14. The method according to any one of preceding
20 claims, wherein said localization data are Global Positioning System Data or triangulation based data.

15. The method according to any one of preceding
claims, wherein said emergency message contains also an indication what type of emergency service is requested.

25

16. The method according to any one of preceding
claims, wherein said emergency message is transmitted to a dispatch centre, and said dispatch centre forwards said emergency message to said other mobile stations.

30

17. The method according to any one of preceding
claims, wherein said dispatch centre is added to said talk group.

18. A mobile station comprising means for signal transmission (602, 604, 606), means for signal reception (608, 604, 606), a microphone (620), an audio processing circuitry (624, 626), a keypad (616), a microprocessor (610), a memory (612), a localization circuitry (614),
5 **characterized in that** it further comprises an emergency switch (622) being adapted to initiate transmission of an emergency message, said emergency message comprising localization data, ID of said mobile station and an
10 indication that this is emergency message.

19. The mobile station according to claim 18 being adapted to receive emergency messages from other mobile stations.

15

20. The mobile station according to any one of claims 18 or 19 being adapted to send its ID and localization data in response to emergency message received from any one of said other mobile stations.

20

21. The mobile station according to any one of claims 18 - 20 being adapted to receive response to emergency message from said other mobile stations.

25 22. The mobile station according to claim 19 or claim 21, wherein said microprocessor being adapted to calculate distance between said mobile station and any one of said other mobile stations.

30 23. The mobile station according to any one of claims 18 to 22, wherein said microprocessor is adapted to store in said memory localization data and IDs received from said other mobile stations.

24. The mobile station according to claim 23, wherein
said microprocessor is adapted to calculate distances
between said first mobile station and any one of said
other mobile stations which have responded to said
5 emergency message and create a talk group comprising
other mobile stations based on said calculated
distances.

25. The mobile station according to any one of claims
10 18 to 24 wherein said localization circuitry is a Global
Positioning System unit.

26. The mobile station according to any one of claims
18 to 24 wherein said microprocessor is adapted to
15 calculate localization of said mobile station based on
triangulation data.

27. A method of automatic creation of a talk group in a
digital radio communication system substantially as
20 hereinbefore described with reference to the description
and FIG. 1 to FIG. 5 of the accompanying drawings.

28. A mobile station for use in a digital radio
communication system substantially as hereinbefore
25 described with reference to the description and FIG. 6
of the accompanying drawings.

Abstract

METHOD AND MOBILE STATION FOR AUTOMATIC CREATION OF TALK
5 GROUP

10 A method of automatic creation of a talk group in a
wireless radio communication system (100) comprising a
plurality of mobile stations (102 - 116), said method
15 comprising the steps of: transmitting (200) by a first
mobile station (102) an emergency message containing at
least its ID and localization data; transmitting (202)
by other mobile stations their IDs and localization data
in response to said emergency message; creating (206)
15 said talk group by selecting those mobile stations which
transmitted their IDs and localization data

FIG. 2 to accompany the Abstract

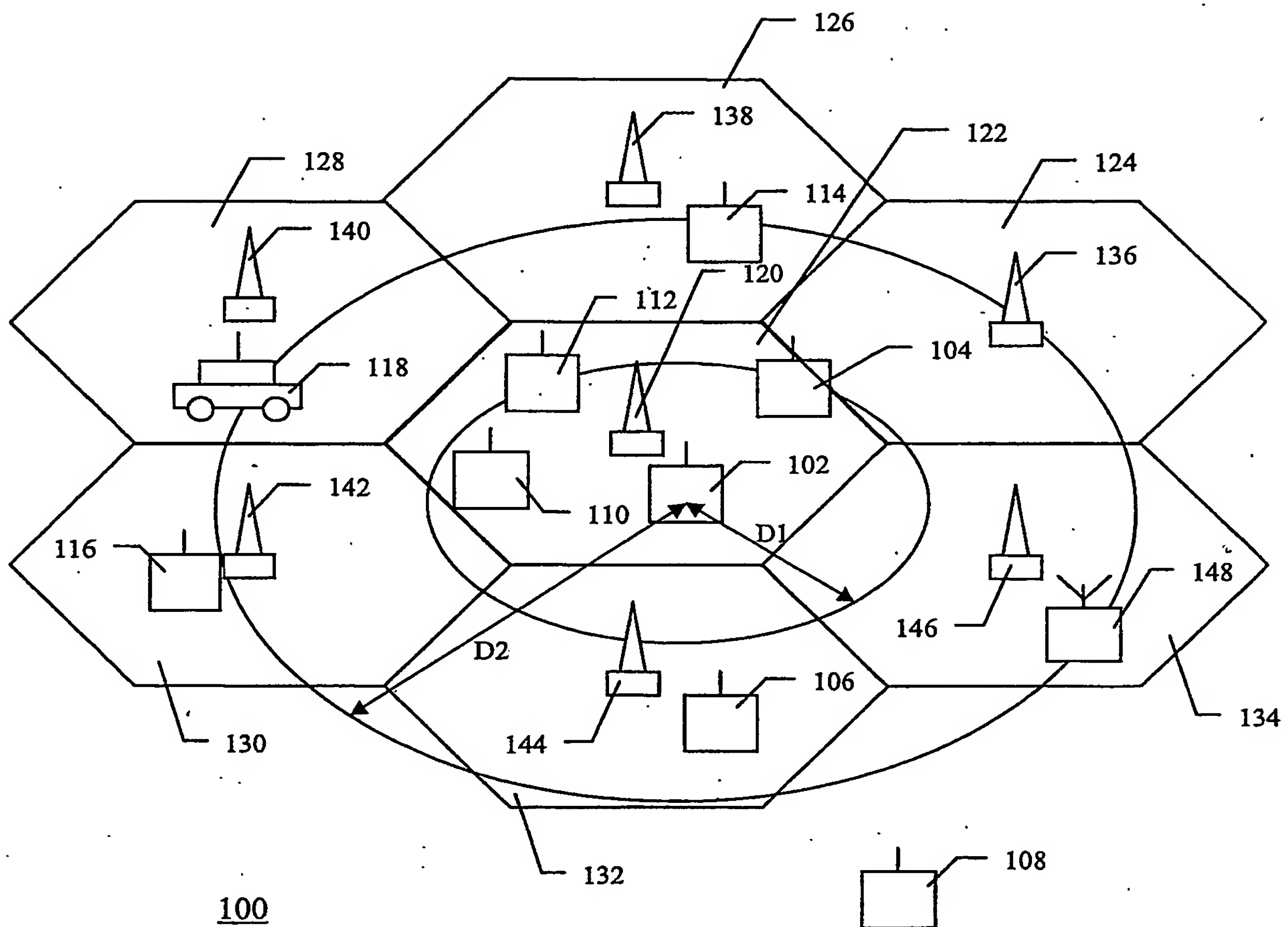


FIG. 1

2/6

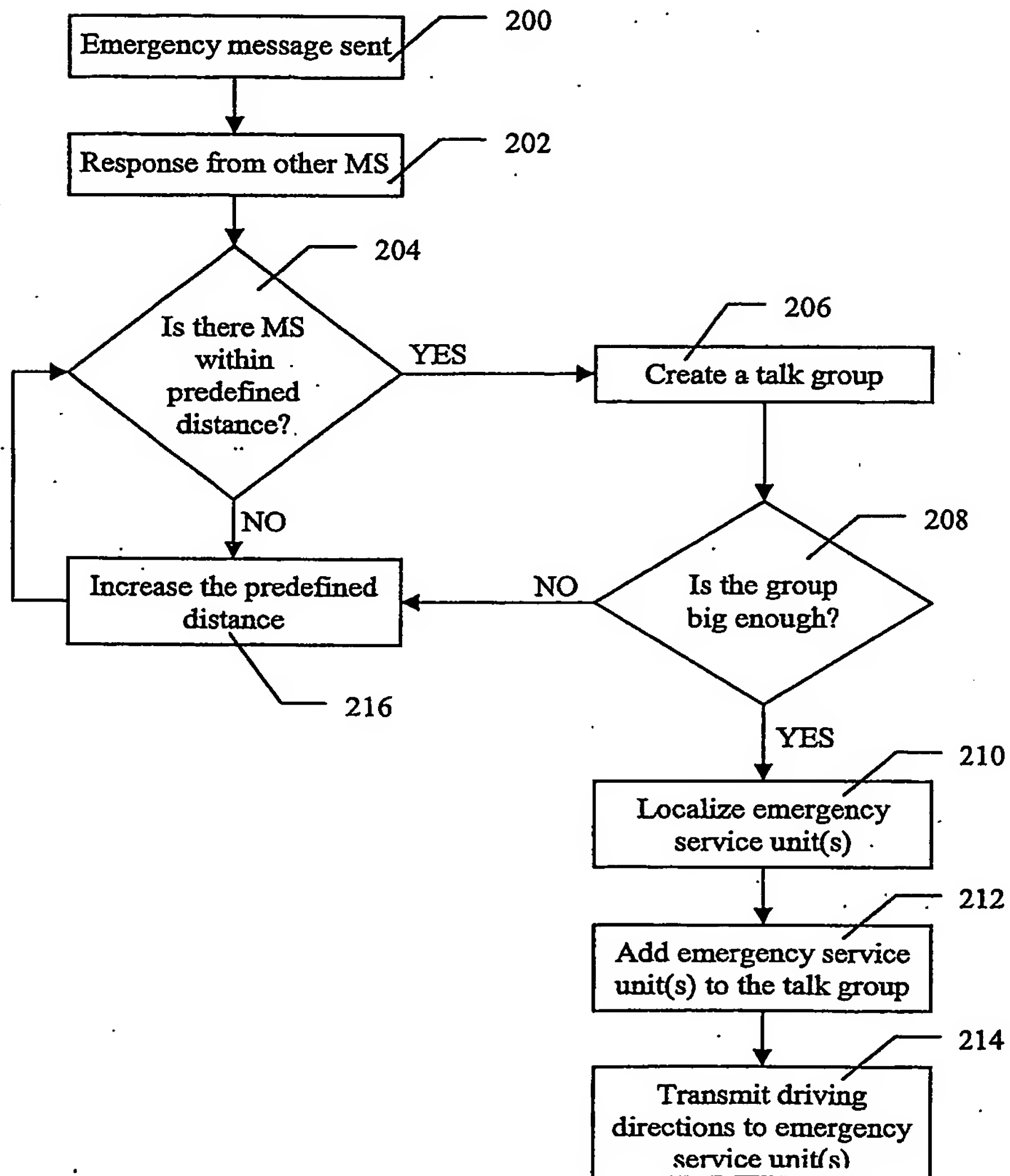


FIG. 2

3/6

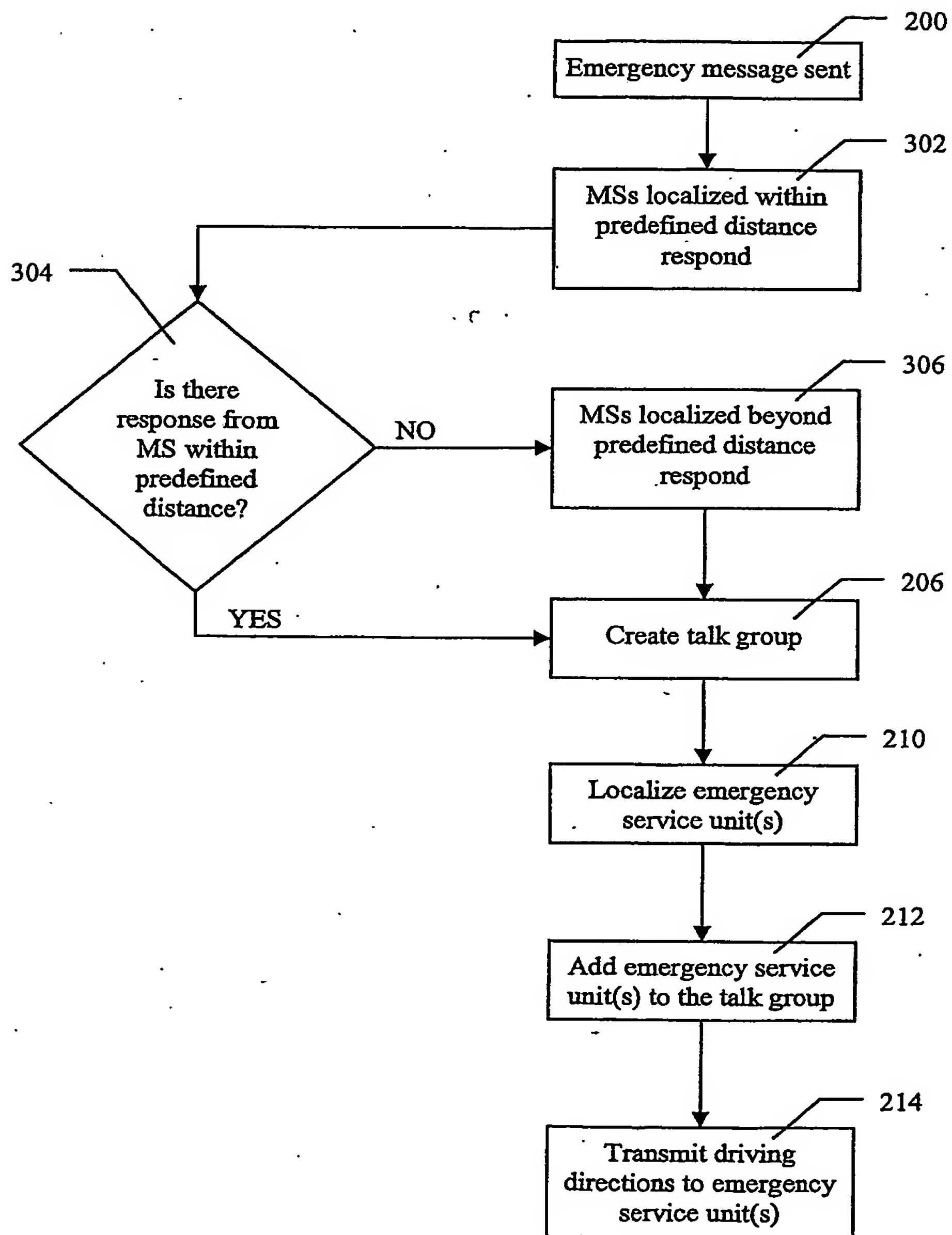


FIG. 3

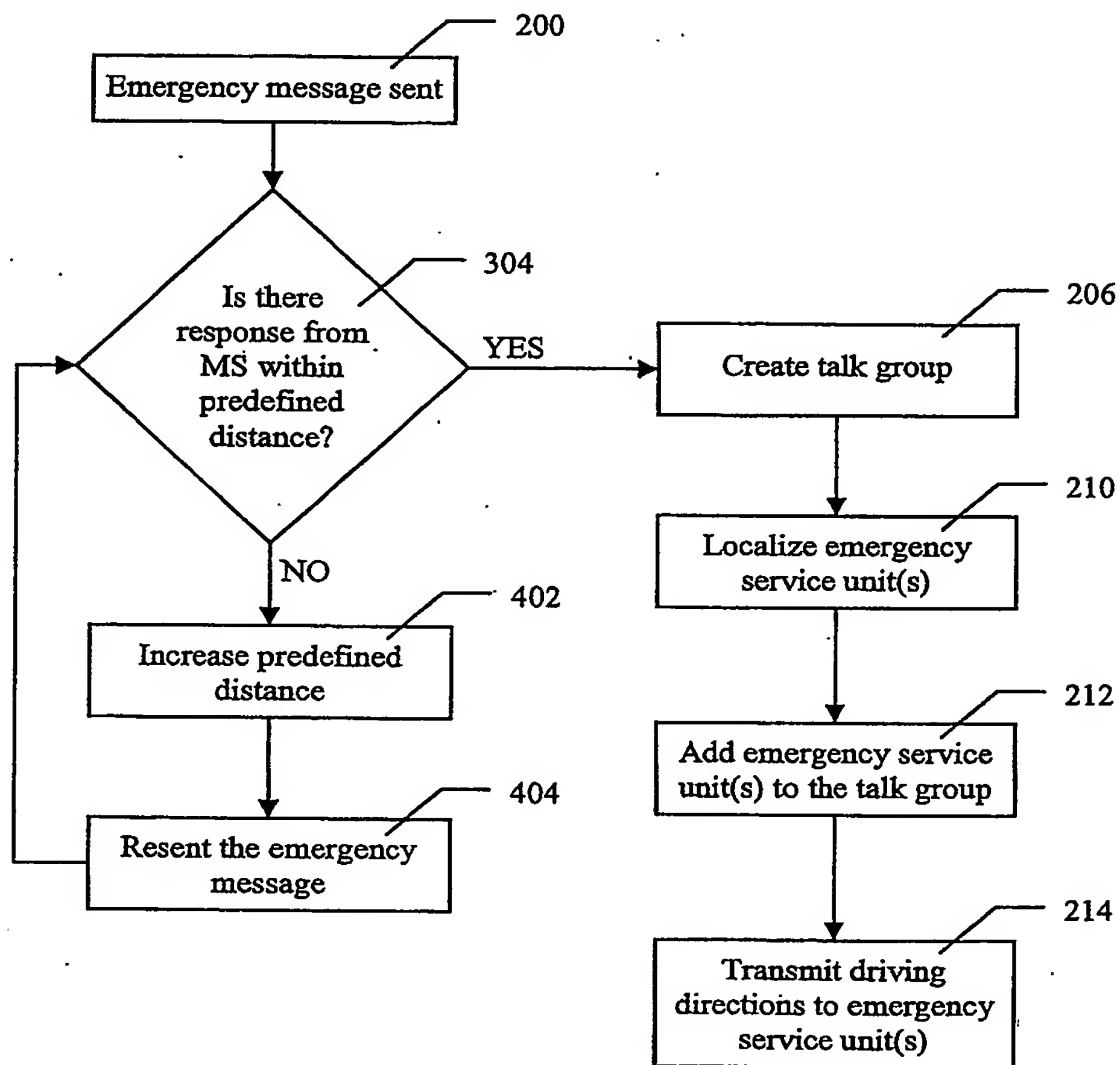


FIG. 4

5/6

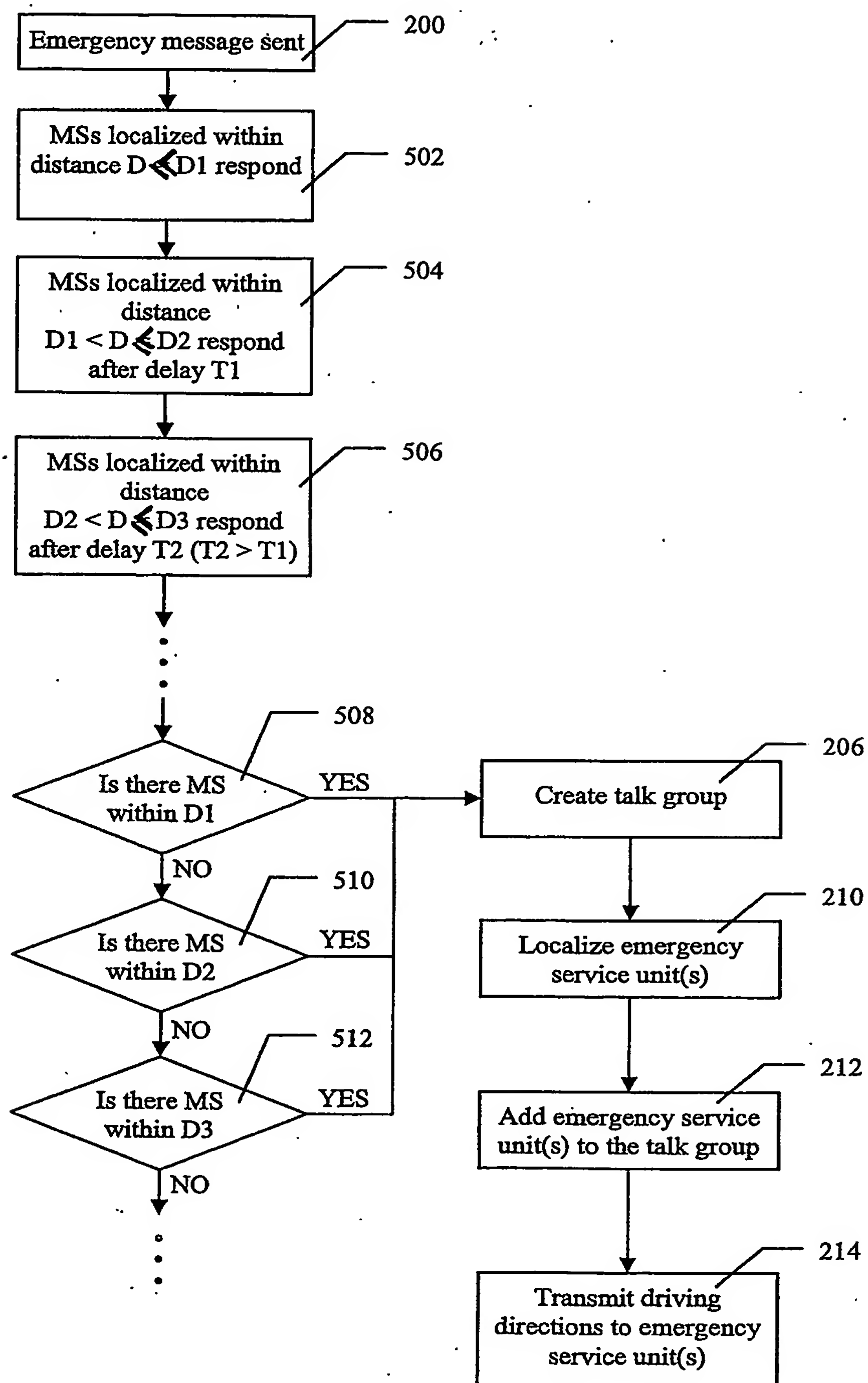


FIG. 5

6/6

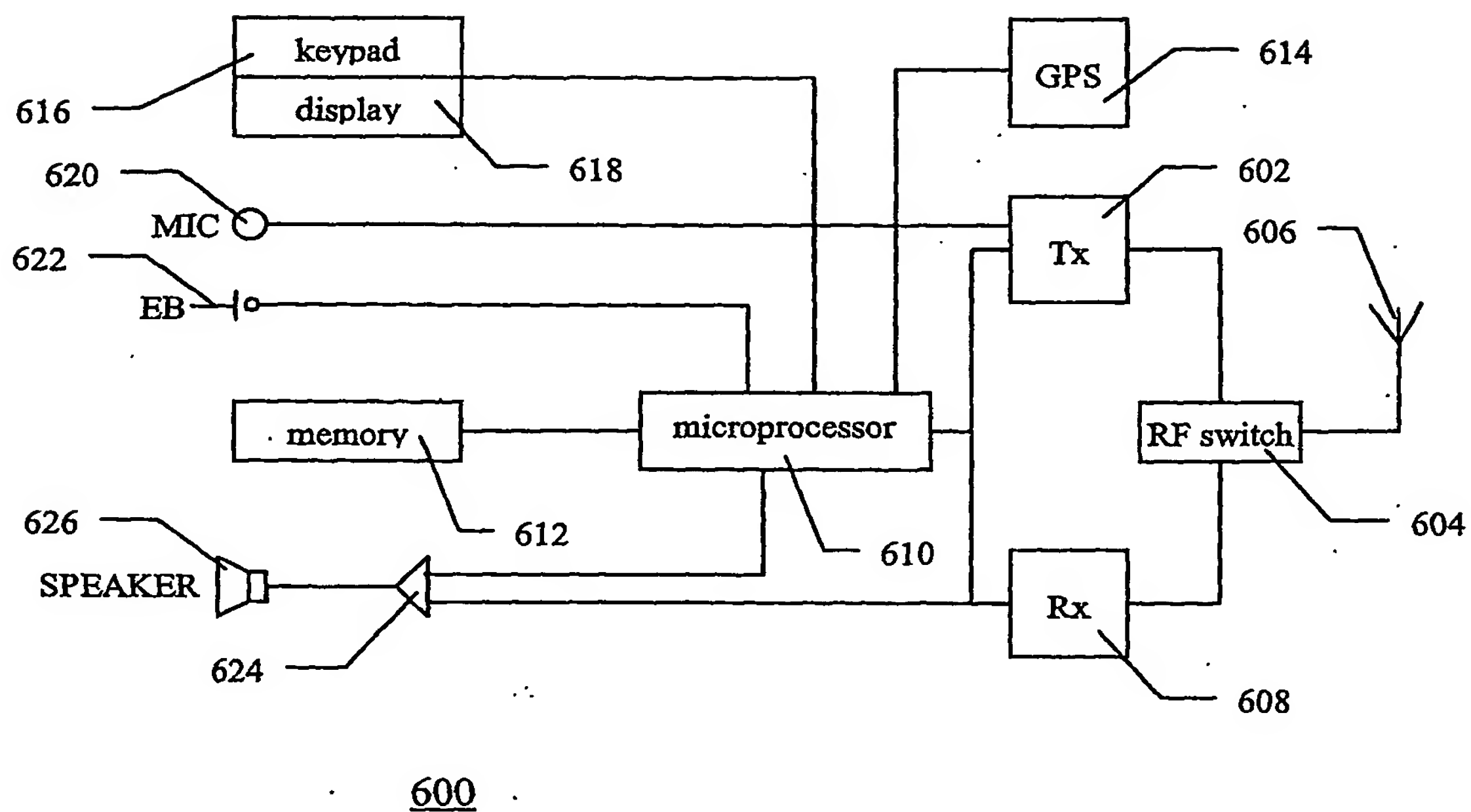


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